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R. Virchow

ABSTRACT. Acclimatization of Europeans to hot climates is discussed. Experience in Algeria, Africa, Australia, Micronesia and other places is described. A differentiation is made between acclimatization of the individual and the race.

I have taken the liberty of placing the topic of acclimatization on the agenda, and not because I am especially well qualified to deal with it, but instead to give the members which have conducted research in many countries the opportunity to give an extensive report on this matter in front of the society. In the Paris Anthropological Society this matter has been a continuous subject of papers since its beginning. Only seldom can one inspect a bulletin without finding a discussion of acclimatization. Even though this is not so often the case for the English society, the English literature contains numerous reports which deal exclusively with this topic. In our country this question still only has secondary interests, even for national economists, apparently because problems which are directly related to only a small fraction of the people are treated only as afterthoughts. And in spite of this, it is apparent that any ordered activity in the area of colonization becomes completely impossible if one is not familiar with the influences of climate on the human body, and especially with the acclimatization capacity of humans. The example of the nations which carried out colonization in early history is sufficient proof of this. /202*

Recently for other reasons it was necessary for me to concern myself with the German colonial literature outside of my professional activity. I must say that I was surprised to see that the preliminary questions which must be answered for every colonization venture ("can humans live anywhere? Can each human live at a certain location? Or what humans can live there?") did not at all become the topic of discussion. Even the material dealing with colonial politics, and which is relatively easy to obtain, does not even touch upon this topic. This has always been different for the medical literature. Important works on medical geography have appeared for more than one century. I would like to recall the medical geography of my colleague Mr. Aug. Hirsch. Recently a young hygiene researcher, Mr. Soyka in Prague, has concerned himself several times with acclimatization. In spite of this the doctors are not aware of all the experience that has been gained. I believe that the questions have not even been formulated in a sufficiently precise manner, so that those points which must be considered as decisive can be subjected to a general discussion.

In this connection I would first of all like to stress that in the question of acclimatization two very closely related, but completely different, conditions are too often confused. This is the acclimatization of the individual, and the so-called acclimatization of the race. Expressed differently, the first question which must be raised is: under what conditions and how long can an individual resist the influences of a foreign climate? To what degree can he become accustomed to it? How long and to what extent does he remain capable of performing /203

*Note: Numbers in the margin indicate pagination in the original foreign text.

work? The other question is: to what extent is it possible to establish a family in a foreign climate, produce offspring and create a continuous colonization with members of a race which is initially foreign to this country? These two questions are concerned with completely different conditions. Even more it can be said that an exact examination shows that for individual countries, and even locations, both questions require a different answer.

One of the examples which became important in the recent political debates is to some extent suitable to give an idea of these differences. In the Reichstag (German Senate) I introduced a note which is cited in Waitz's paper (Anthropology of Natives, Leipzig 1859. I. page 147. Second Edition, published by Gerland. Leipzig, 1877. I. page 148) and which is taken from a treatise by Douwding (Religious Partisanship. Africa in the West. Oxford, 1854). According to this there has been a permanent drop in the white population since slavery was abolished (1833). At the same time there has been a large, but maybe only relative, increase of the colored population. That which has already happened in Haiti to a large extent, namely population by the colored people only, will gradually occur on the other islands as well. Dowding asserted already in 1854 that the whites make up only 5% of the population in all of the West Indies, and that therefore the blacks and the colored population will probably be the only population of the islands in a short time. I then showed that for Jamaica, the only island for which completely reliable statistics are obtainable, the number of whites has been reduced to 2.5% of the total population⁽¹⁾.

Now opponents have informed me that Cuba is an example for the completely opposite condition. They believe that this example shows that when the white man acclimatizes to tropical conditions not just as an individual but permanently as a race, that the race can even expand progressively. I would first like to remark that in Cuba slavery has not been completely abolished and that the most recent law provides that the year 1888 will be the end of slavery. Therefore, a comparison with the English and other colonies is not immediately admissible. In spite of this, it is very important to test the conditions on the "Pearl of the Antilles". Granted, this is not so easy because there are many uncertainties in the statistics of Cuba, where for example different numbers are given by different authors for the same year. In spite of these differences and uncertainties, we may assume that the white population has been increasing for a number of decades. The only question is how it increases. We have earlier data on this point which date from a time at which the problem was treated calmly and objectively without prejudices caused by the conditions of the times. There is a very professional Spanish observer, the special author for Cuba, Ramon de la Sagra, who himself lived on Cuba for twelve years. In a communication to Boudin (Treatise of Medical Geography and Statistics. Paris 1857. Vol. II, p. 196 cf. p. 151, note 1.) he stated that the European race is being progressively destroyed on Cuba and that it is maintaining some vitality only due to the fact that there is a continuous mixing with immigrants from Spain, especially from

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⁽¹⁾ Avasse. (Notes on the English colonies. Paris 1883. Page 302) calculated that in the ten years from 1861-71 the black population increased by 13%, the colored population by 23% and the white population was reduced by 5%. The latter makes up 2.5% of the total population. According to A. C. Sinclair and Lawrence H. Fyfe (the Handbook of Jamaica for 1884-85. London and Jamaica 1884. p. 410) the white population in 1881 was 2.48% and the black population 76.47%.

Gallicia, Catalonia, Asturia and Biscaya. Humboldt mentioned this immigration more than fifty years ago⁽¹⁾. Unfortunately it was not possible for me to determine the number of immigrants with any accuracy; it seems to me that this number must be estimated to be at least 7,000 per year for Havana⁽²⁾.

Mr. Ramon de la Sagra also confirmed the fact for Cuba, which has been a theorem for other Antilles, namely the French Antilles, that a white family, i.e., a creole family, which inhabits the country and is not freshened up by new European blood is found to be no longer fertile after the third generation⁽³⁾.

We therefore arrive at another point which has absolutely nothing to do with the acclimatization of the individual. Acclimatization of the individual, that is the question. How long can an individual carry out the battle of existence under the particular climatic conditions of the new homeland?

Now it is possible that he will be successful in carrying this out. He may even marry and have children. However, very soon one finds that the fertility of the race decreases, i.e., something occurs for humans which is quite similar to what happens in other parts of nature, most extensively and most often in the case of plants. The single individual can be maintained by care and nursing, but this individual is capable of fertile reproduction or the formation of semen only under very exceptional conditions or not at all. The maintenance of the

(1) Alex. de Humboldt. Tableau Statistiques de l'Île de Cuba pour les Années 1825-29 (Statistical Table of the Island of Cuba for the Years 1825-29). Paris 1831, p. 16. When discussing the partial progress of various classes which make up the population, one must not forget that the partial increases and decreases are not only the consequence of natural movement or of the ratio of births to deaths, but that they are influenced by frequent immigrations of white men from Europe, Mexico and Columbia to the island of Cuba. This occurs through the (fraudulent) passage of mulattos with sunburned skin which are in the class of the whites and by secret commerce of African slaves. Humboldt also mentions, later on when he discusses the Republic of Columbia (page 58), that sometimes the colored people have a tendency to pretend they are whites (to be white).

(2) Don Mig. Rodrig. Ferrer, Nature y Civilizacion de la Grandiosa Isla de Cuba. Madrid 1876. P. I p. 432 Not. (Nature and Civilization of the Grandiose Island of Cuba.) calculated that, except for the military occupation forces, that there was an immigration of a total of 21,172 Spainards (peninsular Europeans) and inhabitants of the Canary Islands during the years 1857-59. As for the total number of immigrated persons, I am not quite clear what is the relationship between the Entrados (1854-58; 181,367) to the Transito (61,315). If the latter are subtracted from the former, then one would have to assume an average yearly immigration of about 24,000 persons.

(3) I would like to repeat the statement by Rochoux in Bordier, La Colonisation Scientifique et les Colonies Francaises (Scientific Colonization and French Colonies), Paris 1884, p. 490, that there are possible examples of third generation creoles with a father and a mother in which there was no mixture with European blood.

race is not all identical with the maintenance of individuals. Instead we are dealing with the question of to what extent a family is capable of creating children with sufficient life resistance and life energy through which the race can be reproduced. Now a very special case becomes important which has been investigated in detail many times: what is the special behavior of the woman in the new climate? Then it is the woman which has the principal responsibility in maintaining the race. It is not the fertility of the man which is most important but the fertility of the woman and, as is well known, it can be destroyed very rapidly, in only a few generations.

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What causes a certain climate to be dangerous for the individual? If we consider the climate of those areas which are primarily involved, the tropical and sub-tropical regions, then it seems to me that there are two principal conditions which must be separated. These are conditions which are not at all unknown but which have not been precisely separated and defined in the conscience of the masses, and even of the scientists to a sufficient extent. In fact, the importance of these conditions has not been scientifically established to a sufficient extent for many regions. It seems to me that we should ask travelers and our corresponding members to improve this situation. It is necessary to draw geographical maps which show acclimatization and climate diseases to a much greater degree of detail and reliability than the ones which are presently available. I am of the opinion that two principal conditions are important. First of all, the physical condition which is best defined by the temperature of the location. Preferably it is not the average temperature that should be specified, but the special distribution and duration of the temperature over the year. The development of special harmful materials is completely different from this, even though it undoubtedly depends on the physical conditions. We mean materials which occur in the course of malaria. These are conditions which the French hygiene scientists have given the name Impaludisme. This name has not been chosen very appropriately, because malaria does not exclusively occur in swamps, which should be stressed here. There are other ground conditions, even those in the higher regions, where one can no longer talk of swamps and where malaria develops with full intensity.

The physical conditions, or primarily the temperature distribution over the Earth, have been described in a very instructive report by Mr. Köppen of the German Naval Observatory in Hamburg which appeared in a meteorological journal⁽¹⁾. It appeared before the time of the colonization activity or at least the work was done during this period. The results are presented on a map in a very vivid form. Mr. Köppen determined the heat belts of the Earth according to the duration of the hot, temperate and cold periods. He distinguishes a tropical belt, in which all the months have an average temperature above 20°. Then there are two sub-tropical belts in which it is over 20° in 4-11 months. Then there are two temperate belts in which it is 10-20° for 4-12 months and each of which is again divided into one which is constantly temperate, a belt which has a hot summer and one which has a cold winter. In addition there are the cold belts (1-4

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(1) Meteorological Journal, published by the German Meteorological Society. Berlin 1884. Year 1, page 215. The heat zones of the Earth are considered according to the duration of the hot, temperate and cold period and according to the effect of the heat on the organic world.

months temperate, the others cold) and finally the polar belt (all months below 10°). The horizontal extension of these belts can be easily followed on the map. In our discussion it is especially important to study the deviations which can be found at certain locations, which primarily consist of the fact that in the direction of the meridians the belts are interrupted by regions which have a different temperature distribution in the form of projections or of islands. Let us refer to the southern hemisphere for the moment. South America, as well as South Africa and Australia show much greater differences than one usually imagines by simply reaching a decision based on the geographical latitudes. At all latitudes there are certain regions which were first populated instinctively, but which gradually by experience were found to be regions which permit the existence of the white man. This has been known for South America and South Africa for a long time. I will limit myself to consider Australia briefly, which is especially interesting for our discussion. Mr. Köppen's map shows that the greatest part of the Australian continent belongs to the sub-tropical belt, and there are only narrow coastal zones in the south and east which lie in the temperate belt. From the map one can clearly see what practical experience has extensively shown over the centuries, that is to what extent the white man is capable of work in Australia and at what point it is necessary for him to obtain workers. At this point it is required that not only the farm work, but all the hard work must be carried out by natives or, if they are not available, it must be carried out by imported workers. It is the same requirement which occurred in America and was satisfied by importing Negroes. The north coast of Australia dips into the tropical belt. The northern sections of the eastern coast lie in the sub-tropical belt. Here "foreign hands" are necessary, because the Australians have little tendency or are not capable of working. This is also true in Samoa, which belongs to the tropical belt. In the latter case the workers were primarily obtained from Micronesia, and the Australian planters look in the Melanese Islands. New Britain, New Ireland and finally New Guinea attracted agents and very soon conflicts with the natives occurred, as is always the case in Negro commerce. Undoubtedly the ever-increasing demand sometimes led to a new system of theft, mainly in New Britain, where the masters of Queensland "rent" an arbitrary number of tribesmen as workers from the chiefs by offering firearms and firewater. We hope that German politics will oppose the interests of the inhabitants of Queensland and many plantation owners on islands of the Pacific Ocean. Already the competitors are looking to the unfortunate coolies from India and the Chinese, which cannot be taken away so easily.

One can argue whether the temperature is a sufficient criterion for determining the limit up to which the white man is capable of working. Certainly it is not necessary for me to stress that it is always necessary to organize new work areas in every type of colonization. The example of the Dutch in Java and the English in India shows that it is possible to maintain an existing commercial organization and that one can restrict oneself to exploiting it. However, lazy persons are not capable of acquiring even these colonies. Those persons which are hired as supervisors of plantations or managers of commerce stations cannot adjust to these conditions very easily as experience shows. They cannot count on the fact that they will be able to build up a continuing existence for themselves and their families. In spite of the fact that the Dutch have had possessions over many centuries, they still have not been successful in obtaining a permanent acclimatization of their dependents on Java, even though the climate

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is relatively favorable. The more colonial politics developed, the native conditions were maintained intact as much as possible. The native chiefs and their national organizations were influenced as little as possible. In Dutch India it is the policy of the government to leave the belongings of the natives in their possession and only impose taxes and certain restrictions with respect to planting and distribution of their products. The government is content with collecting the earnings and using them for the benefit of the motherland. The colonization of Java by whites has not reached any appreciable proportions. European families who live there do not have the certainty that they can protect their children from the damaging effects of the climate over a long time.

It is not easy to determine everywhere with certainty where malaria leaves off and the hot climate acts alone. Then we must admit that in the majority of the tropical countries which are known to us, at the present time they both act together. Sometimes there is more or less malaria. It is therefore extremely difficult to find locations where one is safe from malaria. Even in the old colonies such as Cuba, this investigation has never been carried out with scientific reliability. Apparently this was done because slavery was a convenient way of overcoming such difficulties. It is only since the Negro trade has become increasingly difficult that it is necessary to look for other workers. First coolies and Chinese were used to help, but this help was a failure. According to the latest German consulate reports⁽¹⁾, "we first thought of using white workers, and primarily Spainards from the peninsula. However, their mortality is supposed to be so large that this experiment was not attempted. In fact there is no lack of fever on the island. In addition to the feared yellow fever dysentery there are numerous pernicious intermediate varieties. Ferrer⁽²⁾, who has the tendency to represent the sanitary conditions on the island as favorable, has stated that these malaria fevers have taken a greater toll than yellow fever and that they primarily attack the whites, whether they were Europeans or Americans, even though to a somewhat lesser degree. He comforts us with the statement that areas which have had a long exposure to the culture become healthier. However, from the statistics which he gives it can be seen that in the six years from 1854 to 1859 among a total number of 201877 patients in the hospitals of the island there were 19,471 cases of yellow fever and 66,620 cases of assorted fevers. Of the former, 5122 died, or 26.2%. Of the latter 1968 died, or 3%. /208 Therefore, no one will presume that the island can be declared to be free of malaria.

On the other hand, it seems that we may formulate an opinion from the available source material, subject to some reservation, that a part of the Polynesian and Melanesian Islands of the Pacific Ocean is free of malaria to a very great extent, which is very encouraging. Mr. Hirsch⁽³⁾ has made a number of statements for van Diemensland, New Caledonia and New Zealand which may be believed. He

(1) Consulate report on commercial and trade relations on the Island of Cuba, 1881, 1882, 1883 and beginning of 1884. German trade archives 1884, page 712.

(2) Ferrer, loc. cit, p. 429. Intermittent pernicious fevers. In Cuba, this has produced as many, or more, victims than yellow fever. Although it displays a less apparent predilection than the latter, whites -- whether European or American -- seem to be the preferred victims.

(3) A. Hirsch, Handbuch der histor. geograph. Pathologie (Handbook of Historical and Geographical Pathology) Part I. Stuttgart 1881. p. 147, 197.

believes that only the coasts of New Guinea, the New Hebrides and the Tonga Islands are sources of endemic malaria. I am afraid that his report is not very certain in all details. For example, if the Australian continent "to the extent to which it has been populated by Europeans at all, therefore primarily the south and eastern coast" is looked upon as being malaria free, then this is no longer true for Queensland. However, we may believe the fact that malaria is usually restricted to the coastal regions on the small and medium-sized islands, that is the regions which have mangroves. It is also restricted to humid areas of the interior. In any case there is no uniform distribution of malaria over entire islands as is the case for continents at the same latitudes. This remarkable "immunity" only appeared to the extent to which the islands were visited by Europeans in increasing numbers and after information on the state of the visitors and settlers had been obtained. Thus, the number of malaria attacks seems to be small in the interior of Samoa, on certain islands of the New Ireland Archipelago and at certain locations in New Britain. However, we do not wish to say that these locations are truly free of malaria. I have not yet been able to determine whether there is a location in New Guinea which is equivalent to the Polynesian and Melanesian locations. Everything I have learned up to the present makes me believe that malaria is especially strong in New Guinea if we consider the equatorial location of the large country. We must admit that the theoretical difficulties are quite considerable here(1).

I do not wish in any way to doubt that in addition to the heat, the humidity or dryness of the air, the motion of the wind, the altitude and various other factors are exceedingly important. If one were to say to me that in the Sahara it is very healthy in spite of the tropical heat, then I would say to him that I would not mind it a bit if he and a lot of other people would emigrate to the Sahara. For the ordinary immigrant this experience has little practical importance, because they do not intend to populate deserts or to be busy as workers in them. In any case I would like to remind those persons who still recall the earlier voyages of our colleague Nachtigal, who is now deceased, that the fever region begins immediately at the edge of the desert and sometimes even inside it. Nachtigal personally suffered very greatly from it(2) as well as the people that accompanied him and a large number of other people. In any case it is certain

(1) The just published report on the trip made by S. M. S. Elizabeth (Annals of Hydrography and Maritime Meteorology, published by the Hydrographic Admiralty Office. Berlin 1885. XIII. 4 page 202) says the following on the newly discovered Friedrich Wilhelms Port on the west side of Astrolab Bay: "In the evening there are vigorous storms. The wind brought a muddy, uncomfortable smell when it came from the land. According to our experience later on, the climate seems to be unhealthy and to cause fever attacks, because many persons became ill with it. The thermometer showed (November 17th to 20th) over 30°C in the daytime. At night it seldom dropped below 25°C. "The natives in the surrounding areas do not live on the mainland but on the islands."

(2) Gust. Nachtigal, Sahara und Sudan (Sahara and Sudan) Berlin 1879. I. page 144 (Malaria in Murzuq): "With respect to malaria it is not better in Murzuq than in the surroundings of the Tschade Lake, in which the water is stagnated. Many inhabitants of the north coast go there for business, and many of them die there. In Murzuq I suffered more from fever than at any later time in the regions south of the large deserts which are abundant with water. From the fall of 1869 to the spring of 1870 I almost always had an attack every week".

and I do not wish to deny the fact, that a certain moistening of the ground is necessary for the generation of malaria, even though it does not have to be a swamp. Therefore, the advantage of Cuba which has been postulated may be approximately explained by the fact that the amount of rain is much lower than at other locations of tropical America⁽¹⁾. Most tropical countries which are characterized by considerable fertility are usually also relatively moist, and the splendor of the vegetation can usually only hide the danger of the ground for a short time. On the other hand, I do not wish to reject another important condition: this is the intensity of the motion of the air. Otherwise I cannot explain why there is relative immunity of the oceanic islands if it is not due to the strong ventilation which moves over them and which obviously prevents the stagnation of air more than is the case in continental regions. Every fertile and tropical continental region contains so many concealed locations in valleys and gorges, swamps and shallow lakes that the generation and accumulation of malaria cannot be avoided. If we are now told that malaria can be destroyed by all kinds of work carried out to improve the ground, then I wish to say that it is known to me that the holy Hercules carried out a number of such tasks and made entire regions of Greece and Asia habitable according to the opinion of the population. If this is what he had in mind is another question. Probably the efforts of many generations have been united under this name. In any case it is always a difficult thing for immigrants, or those who wish to become immigrants, to wait until the malaria ground has been improved by public or private work and has been truly habitable. I would like to recall the Roman Campagna which the old Garibaldi wanted to clean up. If it is so difficult to overcome malaria under such favorable conditions as being very close to Rome, then we may imagine how difficult it will be to carry out such work in tropical countries and in jungles.

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If we disregard this and turn our attention to those countries in which malaria is not important in any mentionable way, then it seems to me that the temperature is the main thing, except for the desert. Whenever I have considered other factors in the treatment, I have always found that finally the temperature was decisive. Of course if there are temperature conditions at considerable altitudes which are different from those in the lowlands at the base of the high regions and are different again from the lower regions of the mountain country, then it will always finally be the temperature to a greater or lesser extent which determines the capacity for work and the vitality of the individual, which insures the life resistance, life vitality and frame of mind. Constant heat has an extraordinarily weakening effect on human beings. The cases of heart attacks, namely in the case of military exercises, show how great the damages can be which are caused especially in the nervous system and then to the heart by the continuous action of hot air. Anyone who does not believe this can carry out animal experiments and prove this for himself. Since we have now found how humans suffer under these conditions, how their capacity for work drops, then we must admit the fact that there are certain thermal states in which the probability is very small that people which cannot be acclimatized to these temperature conditions can maintain a sufficient capacity for work. However, this deals with the acclimatization of the individual, and does not consider the maintenance of the "race". The question is then raised as to what extent the organism can

⁽¹⁾ Ferrer, l. c. p. 434.

still perform regulatory functions in such a climate.

Now I will admit that the duration of a visit in a hot country can be extended by applying great care. However, in countries where there is heat and malaria simultaneously, experience has shown that even well-to-do persons, the employees of commerce houses, agents of foreign companies, government officials, usually cannot stand it longer than 2-3 years without suffering serious damage to their health. In regions where the malaria is less intense, the tolerance time is longer. I would like to cite an example. When we had dinner in the Congo during which I had the honor of sitting next to Mr. Stanley. I asked him his opinion as to how long white persons could exist in the Congo. He answered he did not know this but he referred to Mr. van der Velde and said: "He is a man who lived continuously in Africa for six years and who, as you can see, is still healthy." However, Mr. van der Velde was at a location which has no or little malaria, as we know. If we therefore consider six years to be a great accomplishment at such locations, then we will have to get used to the fact that up to the present we cannot speak of a true acclimatization of Europeans in tropical Africa.

I would like to mention the following in regards to malaria. It is a great error to say that it is possible to finally become accustomed to malaria, as some people say. This is a complete error. On the contrary, malaria has the peculiarity that the people who have a good dose of fever at one time have a greater tendency to die the next time from miasma. Every new attack increases the tendency to become ill. The tendency of becoming ill again and again can be explained very easily from the fact that every attack leaves certain anatomical residuals in the organs, that is in the lower abdomen, which has been shown by anatomical investigations. A complete reconstruction of the individual after a severe attack is rare. Consumption and malaria - cachexy, also developing in persons which do not have severe attacks of the fever, is very common in fever regions. I can also recall the report of Nachtigal in this regard which /211 deals with the southern parts of the Sudan which he visited. He describes the extent of malaria which attacks not only the foreigners but also the natives(1).

Now experience has shown that various races react to the influences of climate in very different ways and have varying degrees of resistance. When treating this problem in the usual way, one usually restricts oneself to establishing a type of general difference between the white and colored races. This may be appropriate in the majority of cases. However, a more exact investigation has shown that we may not reach such general conclusions at all. That which we call the race here is not such a uniform division of humanity, so that all members would be protected and managed in the same way. This has become most clearly defined in the case of the French colonization of Algeria. As is well known, the French have been spending unbelievably large amounts of money on the colonization of this region which flourished so greatly at one time. They continue to send more people there and always try to obtain new and real settlers.

(1) Nachtigal. Loc. cit. II. page 461 (Disease in Bornu): "The body does also not become accustomed to this poison, so that one can hardly speak of acclimatization in this sense". Page 462: "The natives did not at all maintain the complete immunity to the fever poison which was attributed to them."

However, they always die off in large numbers. Recently in the Reichstag (German Parliament) we got into an argument about the question of whether or not the Alsacians now had a favorable country. Mr. Grad said he had witnessed that a high altitude location in the mountains had been found for the Alsacians who had immigrated last, where they are now flourishing. Unfortunately, statistics have not yet proven this improvement. It is possible that at certain altitudes German nationals could flourish in Algeria. Unfortunately, there is not very much land at this altitude. Most of the land which has been settled has a lower elevation, and there the Alsacians die like flies.

The same phenomena do not exist for all Europeans or whites. Instead there is a gradation of the resistance among the white races. First of all there is a notable contrast within the Indogermanic people, between the Ariers and the Semites. The Arabs as well as the Jews resist the influences of the climate much more. There even seems to be a secondary gradation due to the fact that the Jews, as much as can be learned from the investigations carried out up to the present, propagate very rapidly, whereas for the Arabs there is often a weakening which can only be removed by renewing the blood. The possibility, offered by the Islam religion, of changing the race with women of any descent, even natives, has contributed to a form of continuity. In fact this is not a true continuity of the race, which can be seen from the fact that it becomes a mixture race in time which has very little similarity with the initial race, and which becomes more removed from it from century to century. Thus, for example, the present-day Turks are no longer Turks such as those which immigrated in the 13th, 14th, and 15th century. They gradually change so much that considerable deviations occur.

In the colonization of Algeria the Europeans, i.e., everyone who is called Aryan, were found to be relatively poorly equipped as compared with the Semites. Again a very remarkable gradation occurred. Among the Europeans the Spanish are the most resistant in Algeria. I believe it is correct to state that these are primarily the inhabitants of southern Spain, people from the region of Valencia and Barcelona who emigrate to Algeria in great numbers. So many of them emigrate that the French have said that the Spanish wish to expatriate the French from Algeria. These Spanish people have Semitic blood to a high degree. A considerable amount of mixing has remained from the time of the Moorish domination. Just as the Spanish language has assimilated numerous Arabic elements, the people have also assimilated such elements, and we may certainly assume that the resistance of a large number of them is due to this fact. The Maltese and many people from southern Italy are in the same category. These are regions in which Phoenician and Carthaginian colonies once existed where Arab immigration took place later on. These people carry a large amount of Semitic blood in their veins. We may not formulate this fact by simply saying that a person from the southern regions has a special advantage. Not all southerners have this advantage, but only certain ones. Thus, for example, the Spanish and the Portuguese have been found to be such excellent colonists in hot countries, then we may mention not only the example of Algeria but also numerous other countries. These examples show that what is true for the Spanish, Portuguese, Maltese and Sicilians is not at all true to the same extent for the French. It holds least of all for persons from central and northern France, as well as for people from Germany, Holland and England. These are vulnerable

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racess which have no resistance.

We may console ourselves with the "fact" that, as Mr. Soyka wrote in a document, there is a place in the Vindhya Mountains in eastern India where the French traveler Rousselet found a kind of French colony. About three hundred years ago a small number of French people had settled there, and a continuing colony developed. We may say nothing against the statement that among the many and various locations in the hot zone there is a location, which is apparently very favorable, where members of a vulnerable race are maintained and propagated. We may raise a different question: can India still be cultivated by those vulnerable members of the Aryan race which have become principal carriers of modern culture in Europe? At the present time we must give a negative answer to this question. However, I would like to point to the fact that the race alone is not decisive, as has been shown with complete clarity in India. A large portion of the Indians are Aryan. For some time it was believed that they were the original Aryans from which we ourselves were derived. This view has now been given up. But even from the point of view of moderate "Aryanism" we must say that the Hindu population has acclimatized itself well. It is maintained under very unfavorable conditions, even in malaria regions. They differ fundamentally from the English and the citizens of other countries which follow them. I would therefore like to draw your attention to the theorem that an investigation on the resistance of individual races and tribes cannot be treated /213 in general terms. Each individual case must be treated alone. We must therefore pose ourselves the problem of gradually determining with certainty to what degree each individual population has the capacity of becoming acclimatized in hot countries and, in particular, to settle there permanently.

The question I touched upon before, namely the infertility of women, is the one which dominates the entire area of investigation. The best observers have found that for very many locations three generations is the span of the fertile period. Then the immigrated race dies off either at once or very rapidly. This has been said not only of Cuba and the Antilles, but also of Egypt, India and even for the southern part of North America. Gentlemen, history offers the most extensive and saddest examples of the fact that the resistance of our German nation against hot climates has not proven itself. Anyone who has taken a trip for the first time to visit the country of the Longobards, West Goths or Vandals always carries the silent hope that he will come upon descendents of old Germans, or that he will find villages or least families which have maintained the old type. I must admit that I myself and many of my friends have had this hope. Unfortunately I was not able to notice relatives of our tribesmen, and most of the other observers could not do this either. The large number of Germanic people, entire tribes, who immigrated and who in part had control in foreign countries and controlled the subjected natives with force, have not only disappeared from the political scene, but have disappeared from the physical scene. It seems as though they have been slaughtered. We may imagine, as many people do, that in the mixing of the races the native element gradually gets the upper hand again. This question has been discussed this way in Germany. When we observe brunettes and blondes next to each other, we are easily led to the idea that the brunette race will become more abundant by propagation within the family due to its greater life energy. Thus, the population will change more and more, even though it is maintained as such. This explanation

may be appropriate, for example, in temperate and cold climates. However, it /214 does not correspond to the experience obtained recently for the majority of the warm countries. It is not possible to say that in a population which is transferred to a warmer country from a foreign zone, this type of gradual dominance of the native element is the most usual one. Instead, it is found that the immigrated women lose their fertility more and more and that less and less children are produced by them which still pattern the mother and that the race dies off if the families restrict their marriages strictly within the race. If the men take women from the foreign country, then the mother becomes more dominant. The race is changed much more in this way than by Darwinian selection or other influences. If it is desired to trace these changes to love and hate, high esteem of beauty, strength and other properties, according to the author of "Origin of Species", then I would like to say that I do not entirely disagree. Instead, I would be happy if there were support for this point of view in the ensuing discussion. I would only like to say that during the investigation I was only concerned with the state of the old races. Therefore, I was less inclined to believe that this part of Darwin's hypothesis is the most appropriate in this case. I believe that a race suited for a climate will get the upper hand in other ways.

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